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THGEM/CsI: a potential UV-photon detector for RICH

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In view of their potential application in RICH, we report on the operation properties of single- and cascade-THGEM UV-photon detectors with reflective CsI photocathodes, under simultaneous irradiation of UV and X- or γ -rays.

Our studies were carried out in neon/CH₄ and Ne/CF₄ mixtures, in which conditions were previously found for high photon detection efficiencies –similar to that in present CH₄-operated MWPC/CsI UV-photon RICH detectors. In these mixtures THGEMs were also found to operate over higher dynamic range compared to argon mixtures.

We focused here on the maximum achievable gain at various conditions, sparking probability, cathode-excitation effects and gain stability. The properties of a CH₄-operated MWPC with reflective CsI photocathode, studied in similar conditions, are also reported –for comparison.

We demonstrated that at low counting rates, the maximum achievable gain of the THGEM detector, similarly to most gas-avalanche multipliers, is determined by the Raether limit. At higher rates, the maximal gain continuously drops, though remaining significantly higher than that of the MWPC - under similar conditions; a triple-THGEM suffers much less from cathode excitation effects as compared to MWPC, which makes it suitable for high counting-rate applications. We will also recall other relevant properties of these detectors, and discuss their potential cryogenic operation in noble-gas scintillators.

Please indicate "poster" or "plenary" session. Final decision will be made by session coordinators.

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